WHAT IS CLAIMED IS:

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1. An optical communication system comprising: a source of optical energy to propagate optical energy along an optical path; a detector positioned in the optical path; an optical system having an arcuate surface and a holographic transform function, with the optical element being disposed to filter the optical energy in accordance with properties of the holographic transform function to remove optical energy having unwanted characteristics, defining transformed optical energy, and refract the transformed energy in accordance with properties of the spherical surface to impinge upon the detector.

2. The system as recited in claim 1 wherein the characteristics are selected from a group consisting essentially of polarization, wavelength and phase.

3. The system as recited in claim 1 wherein the source of optical energy includes an array of optical transmitters to generate optical energy to propagate along a plurality of axes and the detector includes an array of optical receivers, each of which is positioned to sense optical energy propagating along one of the plurality of optical axes and the optical system includes an array of lenses, each of which is disposed in one of the plurality of axes and includes the arcuate surface with the holographic transform being disposed within a volume of the array of lenses.

4. The system as recited in claim 1 wherein the source of optical energy includes an array of optical transmitters to generate optical energy to propagate along a plurality of axes and the detector includes an array of optical receivers, each of which is positioned to sense optical energy propagating along one of the plurality of optical axes and the optical system including a plurality of lenses having the arcuate surface with holographic transform function being disposed within a volume thereof, with the plurality of lenses being arranged in first and second arrays, the first array being disposed between the array of optical transmitters and the array of optical receivers and the second array being disposed between the first array and the optical receivers.

5. The system as recited in claim 4 wherein the holographic transform function associated with a subgroup of the lenses of the first array, defining a transfer function, differs from the holographic transform function associated with the remaining lenses of the first array of lenses, and the holographic transform function associated with a subset of the lenses of the second array matches the transfer function.

6. The optical communication system as recited in claim 1 wherein the optical element has opposed sides with a spherical surface being positioned on one of the opposed sides and a planar surface being disposed on the remaining side of the opposed sides with the holographic transform function being disposed within a volume of the lens between the spherical and the planar surfaces.

7. The optical communication system as recited in claim 1 wherein the optical element has opposed sides with a cylindrical surface being positioned on one of the opposed sides and a planar surface being disposed on the remaining side of the opposed sides, with the holographic transform function being disposed within a volume of the lens between the cylindrical and the planar surfaces.

8. The optical communication system as recited in claim 1 wherein the optical element has opposed sides with a spherical surface being positioned on one of the opposed sides and a rotary symmetric arrangement of grooves defining a fresnel lens being disposed on the remaining side of the opposed sides with the holographic transform function being disposed within a volume of the lens between the spherical surface and the fresnel lens.

9. The optical communication system as recited in claim 1 wherein the optical element has opposed sides with a cylindrical surface being positioned on one of the opposed sides and a rotary symmetric arrangement of grooves defining a fresnel lens being disposed on the remaining side of the opposed sides, with the holographic transform function being disposed within a volume of the lens between the cylindrical surface and the fresnel lens.

10. The optical communication system as recited in claim 1 wherein the optical element has opposed side, both of which are arcuate, with the holographic

transform function being disposed within a volume of the lens between the opposed arcuate surface.

11. An optical communication system comprising:

an array of optical transmitters to generate optical energy to propagate along a plurality of axes;

an array of optical receivers, each of which is positioned to sense optical energy propagating along one of the plurality of optical axes;

a first array of refractory lenses, each of which is disposed in one of the plurality of axes and has a first holographic transform function disposed therein to filter from the optical energy unwanted characteristics, with the first holographic transform function associated with a subgroup of the lens of the first array, defining a transfer function, differing from the first holographic transform function associated with the remaining lens of the first array of lenses; and

a second array of refractory lenses, each of which is disposed between the first array of lenses and the array of optical receivers to collect optical energy propagating along the one of the plurality of optical axes, with a subset of the lenses of the second array having a second holographic transform function disposed therein that matches the transfer function.

12. The optical communication system as recited in claim 11 wherein the lenses of the first and second array include a rotary symmetric arrangement of grooves defining a fresnel lens.

13. The optical communication system as recited in claim 11 wherein the lenses of the first and second arrays have a spherical surface and an additional surface disposed opposite to the spherical surface, with a fresnel lens being disposed on the additional surface.

14. The optical communication system as recited in claim 11 wherein the lenses of the first and second arrays have a cylindrical surface and an additional surface disposed opposite to the cylindrical surface, with a fresnel lens being disposed on the additional surface.

~~15. The system as recited in claim 11,~~ wherein the first holographic transform function is disposed within a volume ~~of each of the lenses~~ of the first and array and the second holographic transform function ~~is~~ disposed throughout a volume of each of the lenses of the second array.

Cut A1 16. The system as recited in claim 11 wherein the characteristics ~~are selected~~ from the group consisting ~~essentially of polarization~~, wavelength and phase.

~~17. An~~ optical communication system comprising:

an array of optical transmitters to generate optical energy to propagate along a plurality of axes;

an array of optical receivers, each of which is positioned to sense optical energy propagating along one of the plurality of optical axes;

means disposed between the array of optical transmitters and the array of optic receivers, for concurrently filtering the optical energy to remove unwanted characteristics therefrom and refracting the optical energy to impinge upon the array of optical receivers.

18. The system as recited in claim 17 wherein the concurrently filtering and refracting means further includes means for placing one of the optical transmitters of the array of optical transmitters, defining a first transmitter, in data communication with one of the optical receivers of the array of optical receivers, with the remaining optical receivers of the array of optical receivers being in data communication with optical transmitters of the array of optical transmitters that differ from the first optical transmitter.

19. The system as recited in claim 17 wherein the concurrently filtering and refracting means further includes means for placing one of the optical receivers of the array of optical receivers, defining a first receiver, in data communication with one of the optical transmitters of the array of optical transmitters, with the remaining optical transmitters of the array of optical transmitters being in data communication with optical ~~receivers of the array of optical receivers that differ~~ from the first optical receiver.

~~20. The system as recited in claim 17 wherein the concurrently filtering and~~ refracting means further includes means for placing the array of optical receivers in data communication with the array of optical transmitters, defining a plurality of transmitter/receiver pairs, with the transmitter and receiver of each of the plurality of transmitter/receiver pairs differing from the transmitter and receiver associated with the remaining transmitter/receiver pair of the plurality of transmitter/receiver pairs.